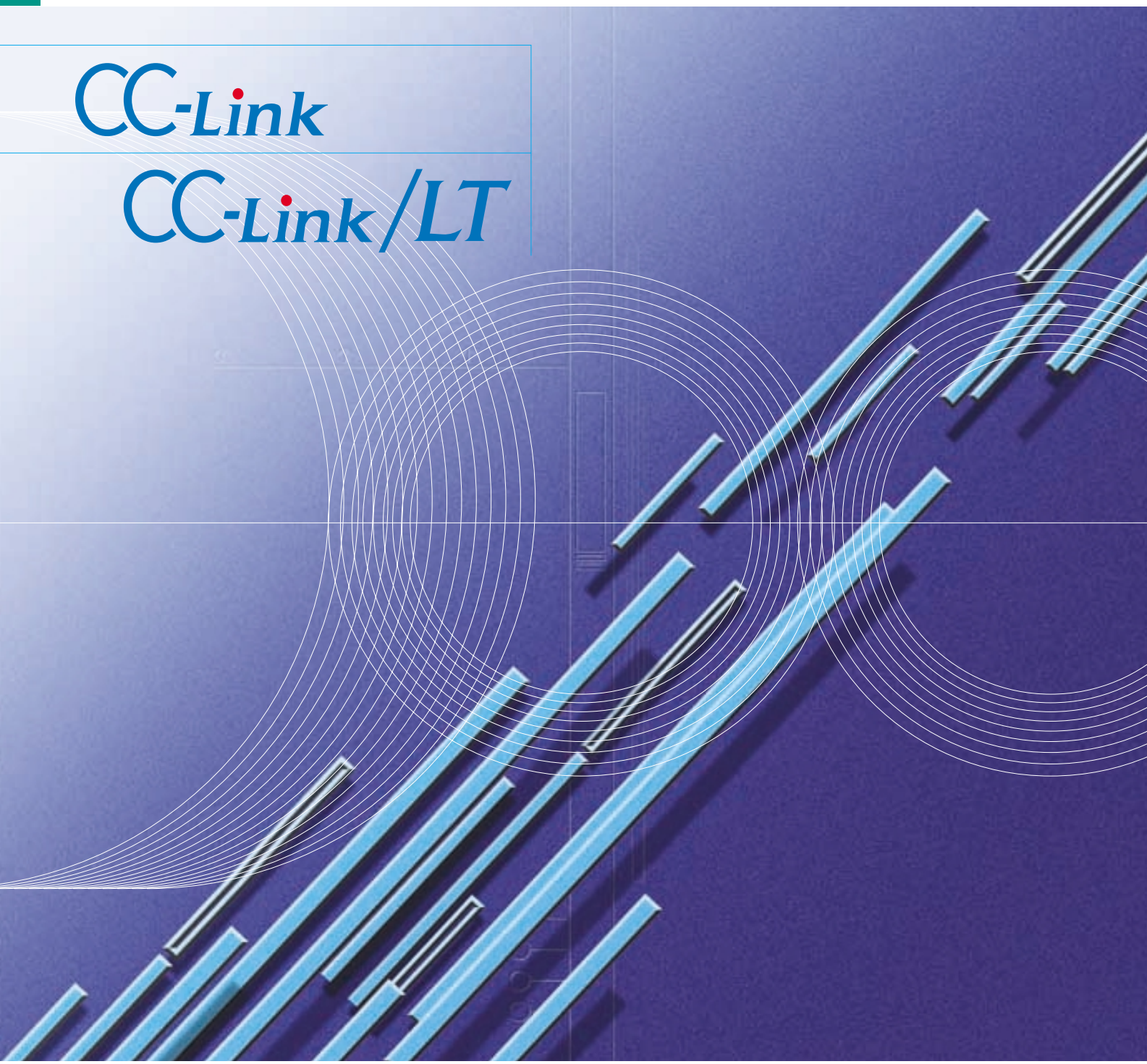
2006 | Dec

Changes for the Better

MITSUBISHI ELECTRIC

Open Field Network
CC-Link, CC-Link/LT Compatible Product Development Guidebook



MELFANS web
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http://MitsubishiElectric.co.jp/melfansweb/english/

MELSOFT

Mitsubishi Electric Corporation Nagoya Works is a factory certified for ISO14001 (standards for environmental management systems) and ISO9001 (standards for quality assurance management systems)

ISO 14001 JACO EC97J1113 UKAS ENVIRONMENTAL MANAGEMENT 051

Certified ISO 9001 by BVQI UKAS QUALITY MANAGEMENT 008

The quickest path to CC-Link & CC-Link/LT compatible product development!

From consulting to the provision of dedicated communication LSIs, Mitsubishi Electric is ready to assist you in speedy development of CC-Link & CC-Link/LT compatible products.

CC-Link
CC-Link/LT

Making your products compatible with CC-Link & CC-Link/LT,
an open field network originating from Japan,
will not only ensure the level of system flexibility distinctively characteristic
of multi-vendor products but also provide you with the opportunity
to boost the competitiveness of your products to the global level once and for all.
With SEMI certification*1, Chinese national standard GB*2 certification,
international standard ISO 15745*3 certification, and now international standard
IEC 61158*4 certification, CC-Link and CC-Link/LT have entered the spotlight.
To ensure quick and certain development
of CC-Link and CC-Link/LT compatible products,
Mitsubishi Electric will support you in every phase of development,
including the provision of dedicated communication LSIs.

*1. SEMI E54, 12
*2. GB/Z ··· "Control and Communication Field Network CC-Link Standard"
*3. "Application Integration Framework"
*4. Industrial network

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Expanding business with CC- Link&CC-Link/LT.

Recommended path to CC-Link & CC-Link/LT compatible product development

Mitsubishi Electric

Inquiries & Consulting

Mitsubishi Electric will provide product development consultation free of charge. Our Open System Center welcomes the opportunity to discuss with you the various development methods available and the related requirements.

[Contact]

Please contact one of the CC-Link Partner Association sites indicated on P. 32. The site will contact the Mitsubishi Electric Nagoya Works Open System Center.

Purchasing Reference Manuals

To purchase reference manuals, contact a Mitsubishi representative office or distributor of the device or product.

Purchasing Dedicated Communication LSIs

To purchase products such as a dedicated communication LSI or built-in interface board specifically required for the development method, contact a Mitsubishi representative office or distributor of the device or product.

Technical Support

Our Open System Center will answer by phone or e-mail any technical questions that you may have during the development process, free of charge. In North America, you may contact the CLPA-N.America office.

(This free support requires the purchase of a reference manual.)

Customer

Development method selection

Development study → **Design and development** → **Assessment and sales preparation** → **Product shipment**

Purchasing of specified parts

CLPA

Joining the CC-Link Partnership Association

In order to develop and sell CC-Link compatible products, you will need to join the CC-Link Partner Association as a regular member, executive member or board member.

[Contact]

Please contact one of the CC-Link Partner Association sites indicated on P. 32.

Obtaining Conformance Test Specifications

For conformance testing of the developed product, the CC-Link Partner Association provides “Conformance Test Specifications” free of charge.

Executing the Conformance Test

The CLPA will conduct a conformance test (fee applied) based on the “Conformance Test Specifications.”

Promotion Support

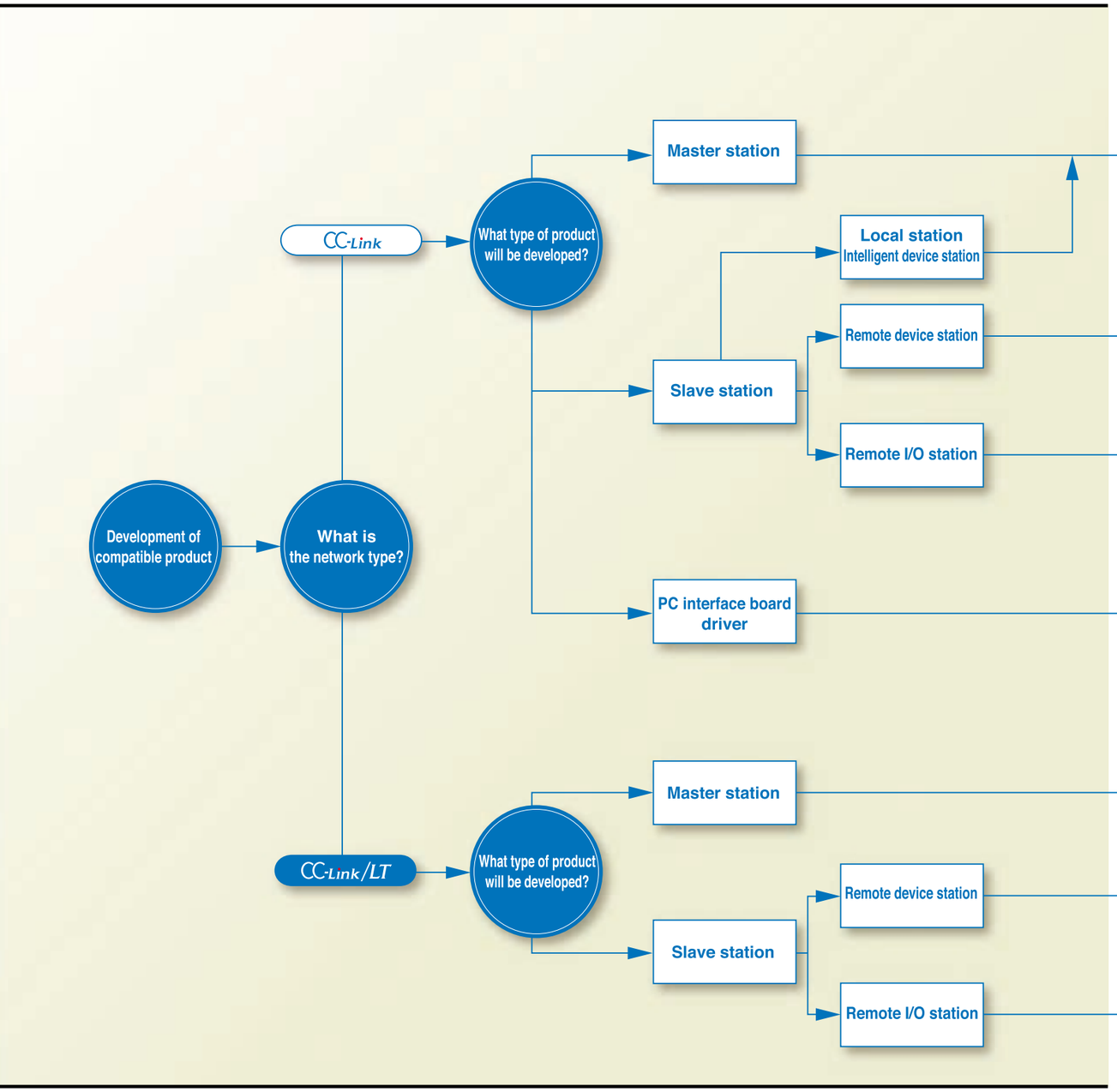
The CC-Link and CC-Link/LT compatible products you have developed will be listed in CLPA catalogs and on our Web site, expanding your opportunities for sales. As a partner manufacturer, you will also be invited to participate in events held by CLPA.

The strongest theme in CC-Link and CC-Link/LT compatible product development is the simultaneous pursuit of quality and development speed. This includes the development of dedicated communication LSIs, which requires from the initial stages extreme efficiency with respect to both cost and speed. Mitsubishi Electric prepares each type of dedicated communication LSI and built-in module through our comprehensive CC-Link & CC-Link/LT related technologies cultivated to date, and is pleased to offer its support in the development of efficient compatible products. Capable of highly detailed assistance, from consulting during the preparation stage to problem solving during development, Mitsubishi Electric and the CC-Link Partner Association (CLPA) are eager to serve you as your partners.

In all areas of development, Mitsubishi Electric offers you solid support.

It's Easy & Speedy.

Mitsubishi Electric provides development methods tailored to the CC- Link & CC-Link/LT compatible product type.



CC-Link

Master Stations, Local Stations, Intelligent Device Stations — P7 to P10

■ Built-in interface board <Q50BD-CCV2>

In this method, stations are developed using a built-in interface board. The CC-Link master station, local station and intelligent device station functions are realized by mounting the interface board on a user circuit board.

Purchase reference manual | Purchase specified parts | Conformance test

■ Object development <SW1D5C-CCV2OBJ-E>*1

In this method, stations are developed using objects. With object based development, use of a built-in interface board results in a design with higher flexibility.

Contract | Purchase reference manual | Purchase dedicated LSI | Purchase specified parts | Conformance test

Remote Device Stations — P11 to P12

■ Dedicated communication LSI <MFP3N>

MFP3N is a communication LSI that allows you to develop devices that handle bit data and word data without concern about protocol. The MPU is mounted and controlled by software. Support of both CC-Link Ver. 1 and Ver. 2 is possible by changing the software.

Purchase reference manual | Purchase dedicated LSI | Purchase specified parts | Conformance test

Remote I/O Stations — P13 to P16

■ Dedicated communication LSI <MFP2N/MFP2AN>

MFP2N and MFP2AN are communication LSIs that allow you to develop devices that handle bit data without concern about protocol. The two types are provided for different package sizes (number of pins) and I/O point quantity.

Purchase reference manual | Purchase dedicated LSI | Purchase specified parts | Conformance test

■ Embedded I/O Adapter*2*3

This small-sized Embedded adapter allows you to develop devices that handle bit data without concern about protocol. The module can be mounted directly on the circuit board you developed, and allows expansion of the number of I/O points through cascade connection. (A maximum of two modules can be mounted on a single circuit

Purchase reference manual | Conformance test

Drivers (for Q80BD-J61BT11N) — P17 to P18

■ Driver reference manual*2

Drivers for various operating systems can be developed for use of the Mitsubishi PC interface board (Q80BD-J61BT11N).

Purchase reference manual

CC-Link/LT

Master Stations — P19 to P20

■ Dedicated communication LSI <CLC13>*4

CLC13 is a communication LSI that allows you to develop devices compliant with the master station used for network management. The network can be constructed by connecting the various slave stations.

Purchase reference manual | Purchase dedicated LSI | Purchase recommended Parts | Conformance test

Remote Device Stations — P21 to P22

■ Dedicated communication LSI <CLC31>*4

CLC31 is a communication LSI that allows you to readily handle CC-Link/LT word data (16-bit data). The data amount of four words can be handled by a single LSI, allowing easy development of analog I/O and other remote device stations.

Purchase reference manual | Purchase dedicated LSI | Purchase recommended Parts | Conformance test

Remote I/O Stations — P23 to P24

■ Dedicated communication LSI <CLC21>*4

CLC21 is a communication LSI that allows you to develop devices that handle bit data without concern about protocol. This LSI enables easy development of digital I/O and other remote I/O stations.

Purchase reference manual | Purchase dedicated LSI | Purchase recommended Parts | Conformance test

*1. The reference manual is included with SW1D5C-CCV20BJ.
*2. CC-Link Partner Association membership is not always necessary. For details, contact your local CLPA office.
*3. The conformance test is sometimes not required. For details, contact your local CLPA office.
*4. The specified parts to be purchased include recommended parts.

CC-Link Developing Master Stations, Local Stations and Intelligent Device Stations

Purchase reference manual | Purchase specified parts | Conformance test

CC-Link Ver.2 Built-in Interface Board Q50BD-CCV2

1. The CC-Link Ver.2 built-in interface board enables easy development of master stations, standby master stations, local stations and intelligent device stations.
CC-Link master station, standby master station, local station and intelligent device station functions can be realized by mounting the interface board onto the user circuit board.

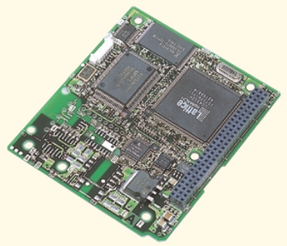
2. This product is compatible with CC-Link Ver.2.
With CC-Link Ver.2 compatibility, the number of cyclic data points can be extended to 8,192 points for RX/RY and 2,048 words for RWr/RWw. The board is also compatible with old specifications (Ver.1).

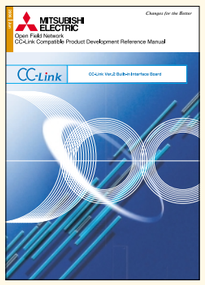
3. Minimal space is required.
The interface board is designed with a compact size of 70mm x 80mm.

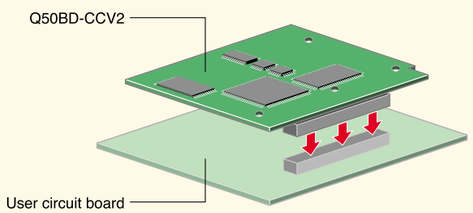
4. Communication with user circuit board circuitry can be easily performed using a general-purpose bus interface.
The interface between the user circuit board and interface board is comprised of general memory control signals (address bus, data bus, read, write, etc.), making communication with the user circuit board easy.

- Upon request, hardware and software development partners are introduced.
- Lead-free/RoHS directive compliant

■Q50BD-CCV2





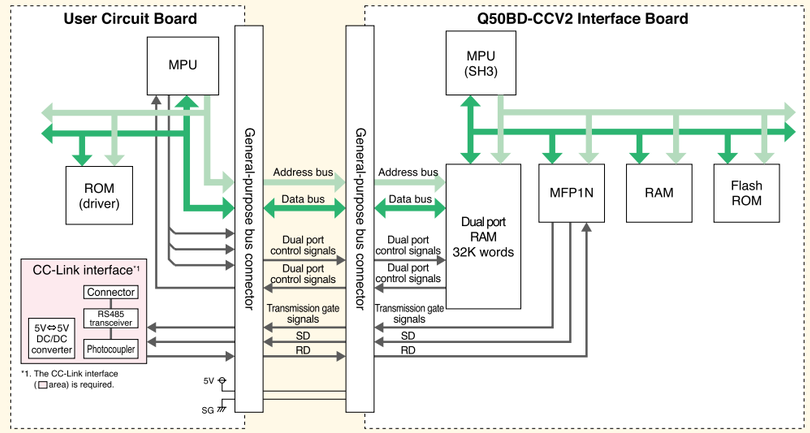


Interface board and user circuit board configuration example

■Built-in interface board basic specifications

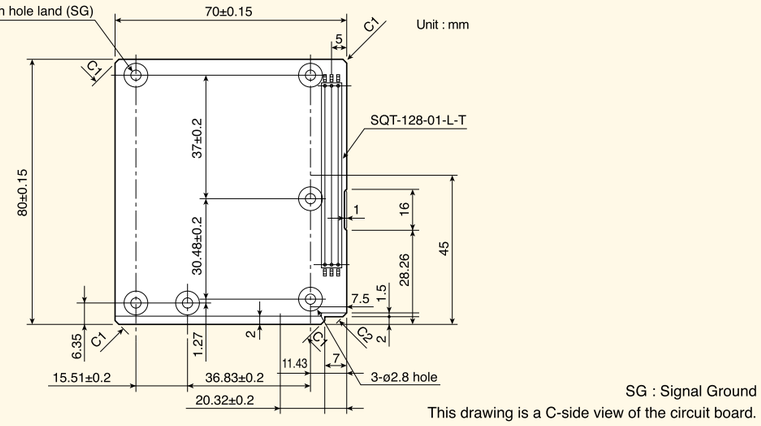
Classification	Item	Description
		Q50BD-CCV2
Bus, MPU	Bus interface	General-purpose bus interface
	MPU	SH3 (SH7708R) QFP 144 pins
Internal memory	ROM	ROM 512K words x 16 bits (8Mbits)
	SRAM	Dual port RAM 32K words x 16 bits (512Kbits)
		Work RAM 256K words x 16 bits (4Mbits)
Communication area	Communication chip	MFP1N
Display		Six LEDs: Green (RUN, L RUN, SD, RD) Red (ERR., L ERR.)
Switch		Station number switch, transmission speed, mode switch, select switch
Current consumption		0.32A
Circuit board dimensions		70.0 x 80.0mm
Weight		0.03kg

■Interface Board and User Circuit Board Block Diagram



SG : Signal Ground

■Circuit Board Dimensions



SG : Signal Ground
This drawing is a C-side view of the circuit board.

■Manual

Q50BD-CCV2 Reference Manual

Title	Manual No.	Contact
CC-Link Ver.2 Built-in Interface Board Reference Manual	SH(NA)-080324ENG	Mitsubishi Electric Corporation

*Provides circuit examples, timing charts, pin assignments and driver development methods.

■CC-Link Ver.2 Built-in Interface Board Q50BD-CCV2

Name	Model	Contact
CC-Link Ver.2 Built-in Interface Board	Q50BD-CCV2	Mitsubishi Electric Corporation

CC-Link Developing Master Stations, Local Stations and Intelligent Device Stations

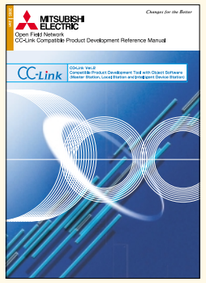
Contract | Purchase reference manual | Purchase dedicated LSI | Purchase specified parts | Conformance test

CC-Link Ver.2 Object Development

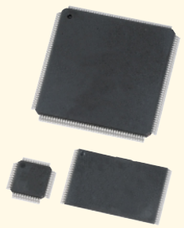
1. The CC-Link Ver.2 compatible product development tool with object software allows you to develop master stations, local stations, intelligent device stations and standby master stations.
2. This product is compatible with CC-Link Ver.2.
   With CC-Link Ver.2, the maximum number of cyclic data points can be extended to 8,192 points for RX/RY and 2,048 words for RWr/RWw. CC-Link Ver.2 is also compatible with old specifications (Ver.1.10).
3. Data communication can be easily performed.
   Use of a dual port RAM enables easy data communication between the network circuit and user application circuit.
4. The object code installation method is selectable.
   To develop CC-Link Ver.2 compatible products, object code installation is required. An installation method can be selected from two methods: using serial communication and using a ROM writer. As a transfer tool for the serial communication, use the “Hyper Terminal” function provided in Windows®2000/Windows®XP.
5. The CC-Link Ver.2 compatible product development tool with object software is composed of the object code (SW1D5C-CCV2OBJ-E) and a network circuit. The network circuit is made up using a device kit (Q6KT-NPC2OG51).

- Upon request, hardware and software development partners are introduced.
- Lead-free/RoHS directive compliant

■SW1D5C-CCV2OBJ-E



■Device kit



■Communication LSI (MFP1N)

■Manual

SW1D5C-CCV20BJ-E Reference Manual

Title	Manual No.	Contact
CC-Link Ver.2 Compatible Product Development Tool with Object Software (Master Station, Local Station and Intelligent Device Station) Reference Manual	SH(NA)-080552ENG	Mitsubishi Electric Corporation

*Provides circuit examples, timing charts and driver development methods.

■Dedicated Communication LSI (MFP1N), Device Kit

[1] Dedicated Communication LSI (MFP1N)

Name	Model	Packaging Unit	Contact
MFP1N (PC96002M-C)	A6GA-CCMFP1NN60F	60 pieces	Mitsubishi Electric Corporation
	A6GA-CCMFP1NN300F	300 pieces	

*Package: 100-pins, QFP size: 20 x 14mm, Pin spacing: 0.65mm

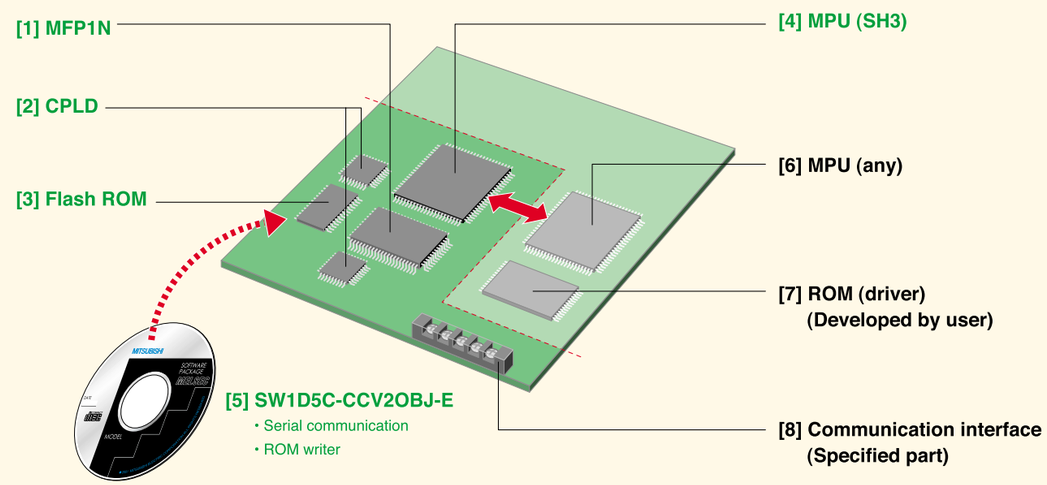
[2] Device Kit

Name	Model	Packaging Unit	Contact
Device kit	Q6KT-NPC2OG51 (Flash ROM x 1, CPLD x 2) x 40	40 sets	Mitsubishi Electric Corporation

■Object Code

Title	Model	Contact
CC-Link Ver. 2 Compatible Product Development Tool with Object Software CD-ROM	SW1D5C-CCV2OBJ-E	Mitsubishi Electric Corporation

■Mounting Example with Object Development



	Name	Product Name	Manufacturer
[1]	MFP1N (PC96002M-C)	A6GA-CCMFP1NN**F Master, Local, Intelligent Device Station LSI	Mitsubishi Electric Corporation
[2]	CPLD	Q6KT-NPC2OG51 (Device Kit) (Flash ROM x 1, CPLD x 2) x 40	Mitsubishi Electric Corporation
[3]	Flash ROM		
[4]	MPU (CC-Link compatible product development tool with object software area)	SH3 (SH7708R)	Renesas Technology Corporation
[5]	SW1D5C-CCV2OBJ-E	Object (firmware binary file)	Mitsubishi Electric Corporation
[6]	MPU	Any MPU can be used.	Any manufacturer
[7]	Driver	Firmware used to communicate with the CC-Link compatible product development tool with object software area.	Developed by user
[8]	Communication interface	Use the specified part.	Each manufacturer

■CC-Link Ver.2 Compatible Product Development Tool with Object Software Basic Specifications

Classification	Item	Description
		Network Circuit
MPU	MPU	SH3 (SH7708R) QFP 144 pins
Internal memory	ROM	ROM 512K words x 16 bits (8M bits)
	SRAM	Dual port RAM 32K words x 16 bits (512K bits)
		Work RAM 256K words x 16 bits (4M bits)
Communication area	Communication chip	MFP1N
Display		Nine LEDs : Green*1 (RUN, L RUN, SD, RD, BOOT, BOOT OK)
		Red*1 (ERR., L ERR., BOOT ERR)
Switch		Station number switch, transmission speed, mode switch, select switch

*1. The LED layout, colors and shapes are not specified. (The colors indicated are examples.)

CC-Link Developing the Remote Device Stations

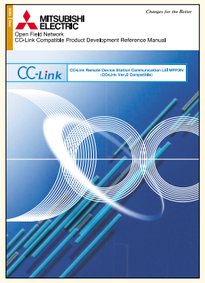
Purchase reference manual | Purchase dedicated LSI | Purchase specified parts | Conformance test

Dedicated Communication LSI MFP3N

MFP3N is a communication LSI used to develop remote device stations. MFP3N has a built-in communication protocol which enables the MPU to access the memory of the MFP3N transmission/reception buffer, allowing you to develop devices that handle bit and word data without requiring protocol awareness. With CC-Link Ver.2, software must be developed to work with the MFP3N. Remote device station development is possible using the same MFP3N for both CC-Link Ver.1 and CC-Link Ver.2.

- Upon request, hardware and software development partners are introduced.
- Lead-free/RoHS directive compliant

■MFP3N



*The location of the dot may differ from the actual product.

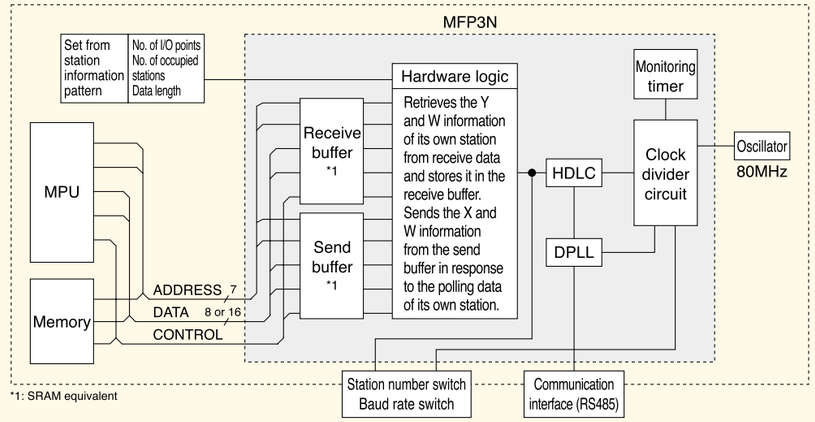
■Data Size

The remote Input/Output (RX/RY: bit data) and remote register (RWw/RWr: word data) can handle the amount of data shown in the table below, based on the number of occupied stations.

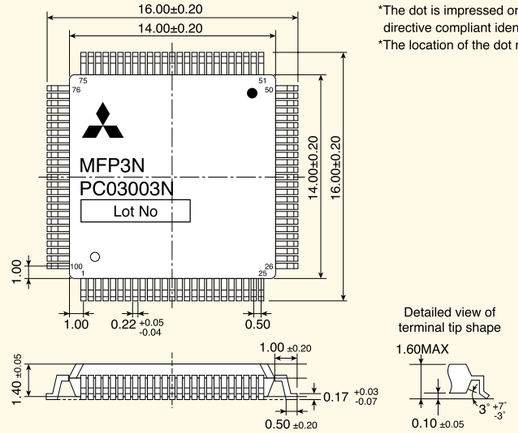
Type		Version	Extended Cyclic Setting	No. of Occupied Stations			
				1 Occupied Station	2 Occupied Stations	3 Occupied Stations	4 Occupied Stations
Remote input: RX		Ver.1	–	32 points	64 points*	96 points*	128 points*
		Ver.2	Double	32 points	96 points	160 points	224 points
			Quadruple	64 points	192 points	320 points	448 points
			Octuple	128 points	384 points	640 points	896 points
Remote output: RY		Ver.1	–	32 points	64 points*	96 points*	128 points*
		Ver.2	Double	32 points	96 points	160 points	224 points
			Quadruple	64 points	192 points	320 points	448 points
			Octuple	128 points	384 points	640 points	896 points
Remote register	M→R:RWw	Ver.1	–	4 words	8 words	12 words	16 words
		Ver.2	Double	8 words	16 words	24 words	32 words
			Quadruple	16 words	32 words	48 words	64 words
			Octuple	32 words	64 words	96 words	128 words
	R→M:RWr	Ver.1	–	4 words	8 words	12 words	16 words
		Ver.2	Double	8 words	16 words	24 words	32 words
			Quadruple	16 words	32 words	48 words	64 words
			Octuple	32 words	64 words	96 words	128 words

*The last 16 points are reserved by the system.

■General Block Diagram



■External Dimensions



*The dot is impressed on the package as a lead-free/RoHS directive compliant identification mark.
*The location of the dot may differ from the actual product.

Unit : mm

■Manual

Title	Manual No.	Contact
CC-Link Remote Device Station Communication LSI MFP3N (CC-Link Ver.2 Compatible) Reference Manual	SH(NA)-080624ENG	Mitsubishi Electric Corporation

*Provides circuit examples, MFP3N electrical characteristics, pin assignments and a detailed memory map sample flow.

■Dedicated Communication LSI (MFP3N)

Name	Model	Packaging Unit	Contact
MFP3N (PC03003N)	A6GA-CCMFP3NN60F	60 pieces	Mitsubishi Electric Corporation
	A6GA-CCMFP3NN300F	300 pieces	

*Package: 100-pins, QFP size: 14 x 14mm, Pin spacing: 0.5mm

CC-Link Developing Remote I/O Stations

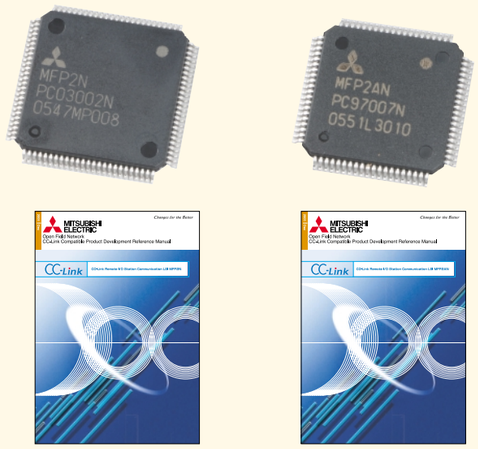
Purchase reference manual | Purchase dedicated LSI | Purchase specified parts | Conformance test

Dedicated Communication LSI MFP2N / MFP2AN

MFP2N and MFP2AN are communication LSIs used to develop remote I/O stations. The difference between MFP2N and MFP2AN lies in the package size (number of pins) and I/O point quantity.
Other than the package size (number of pins) and I/O point quantity, the LSIs are identical. The master treats both LSIs as remote I/O stations without differentiation. Having both MFP2N and MFP2AN remote I/O stations in the same system is problem-free. Featuring a smaller package size and 16 I/O points, MFP2AN is well suited to small-size remote I/O station development.
With MFP2N and MFP2AN, CC-Link protocol is fully realized using the dedicated communication LSI, enabling protocol development with hardware only. (Devices such as an MPU or software are not required.)

- Upon request, hardware development partners are introduced.
- Lead-free/RoHS directive compliant

■MFP2N ■MFP2AN



*The location of the dot may differ from the actual product.

■No. of MFP2N I/O Points

The remote I/O station has only one occupied station.The number of I/O points can be selected from the following combinations.

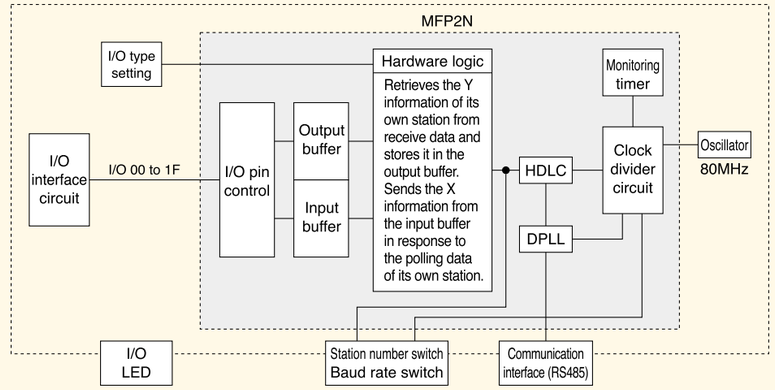
	I/O type		Remarks
	Remote Input	Remote Output	
(1)	8 points	–	Any setting other than the 8 types is not possible.
(2)	–	8 points	
(3)	16 points	–	
(4)	–	16 points	
(5)	8 points	8 points	
(6)	32 points	–	
(7)	–	32 points	
(8)	16 points	16 points	

■No. of MFP2AN I/O Points

The remote I/O station has only one occupied stations. The number of I/O points can be selected from the following combinations.

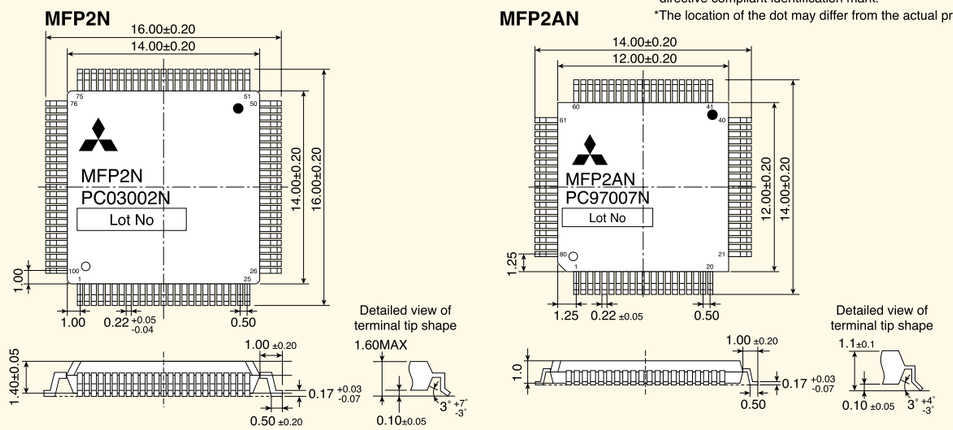
	I/O type		Remarks
	Remote Input	Remote Output	
(1)	16 points	–	Any setting other than the 3 types is not possible.
(2)	–	16 points	
(3)	8 points	8 points	

■General Block Diagram (MFP2N)


MFP2N
I/O type setting
Hardware logic
Retrieves the Y information of its own station from receive data and stores it in the output buffer. Sends the X information from the input buffer in response to the polling data of its own station.
Monitoring timer
I/O interface circuit
I/O 00 to 1F
I/O pin control
Output buffer
Input buffer
HDLC
Clock divider circuit
Oscillator
80MHz
DPLL
I/O LED
Station number switch
Baud rate switch
Communication interface (RS485)

■External Dimensions

*The dot is impressed on the package as a lead-free/RoHS directive compliant identification mark.
*The location of the dot may differ from the actual product.



Unit : mm

■Manual (MFP2N / MFP2AN)

Title	Manual No.	Contact
CC-Link Remote I/O Station Communication LSI MFP2N Reference Manual	SH(NA)-080622ENG	Mitsubishi Electric Corporation
CC-Link Remote I/O Station Communication LSI MFP2AN Reference Manual	SH(NA)-080623ENG	

*Provides circuit examples, MFP2N electrical characteristics and pin assignments.

■Dedicated Communication LSI (MFP2N / MFP2AN)

Name	Model	Packaging Unit	Contact
MFP2N (PC03002N)	A6GA-CCMFP2NN60F	60 pieces	Mitsubishi Electric Corporation
	A6GA-CCMFP2NN300F	300 pieces	
MFP2AN (PC97007N)	A6GA-CCMFP2ANN60F	60 pieces	
	A6GA-CCMFP2ANN300F	300 pieces	

*Package: MFP2N 100 pins, QFP size: 14 x 14, Pin spacing: 0.5mm
MFP2AN 80 pins, QFP size: 12 x 12, Pin spacing: 0.5mm

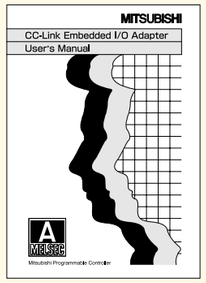
CC-Link Developing Remote I/O Stations

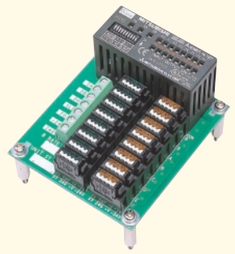
Purchase reference manual

Conformance test

CC-Link Embedded I/O Adapter

■AJ65MBTL1N-16DT, AJ65MBTL1N-16D, AJ65MBTL1N-16T
AJ65MBTL1N-32D, AJ65MBTL1N-32T





The above modules are small-sized remote I/Os that can be mounted directly onto a user-manufactured circuit board, making the modules ideal for incorporation into devices.

1. The modules are circuit board mounted remote I/O modules that are built into other devices.

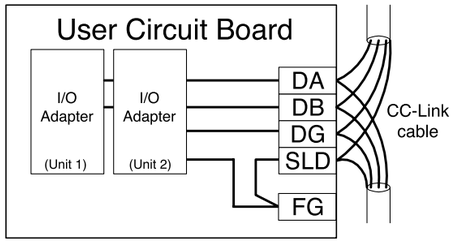
2. The external interface (unit power supply, transmission, I/O signal, etc.) is a pin header, allowing you to directly mount the module onto the user-side device circuit board.
AJ65MBTL1N-16DT, AJ65MBTL1N-16D, AJ65MBTL1N-16T: 44-pin, 2-row, 2mm-pitch pin header
AJ65MBTL1N-32D, AJ65MBTL1N-32T: 62-pin, 2-row, 2mm-pitch pin header

3. The isolation methods employed are transformer isolation for unit power supply and photocoupler isolation for external I/O.

4. The transistor output area is provided with overload and overheat protection features.

5. These modules include the dedicated LSI, specified parts, station number switches, and LED indicators.

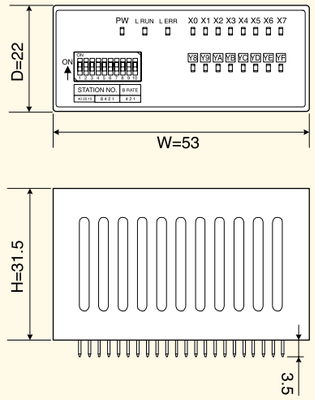
6. The I/O Adapters can be cascaded, allowing you to mount a maximum of two I/O Adapters on the same circuit board. A distance of 5mm or more is required between I/O Adapters. The station number and transmission speed settings must be set for each module. The I/O allocation for the I/O Adapter is 32 points per station. Although the latter 16 points of a 16-point I/O Adapters are open, they cannot be used even if modules are cascaded.



The modules can be cascaded on the user circuit board as illustrated above. (Cascade connection limit: 1 unit, max.)

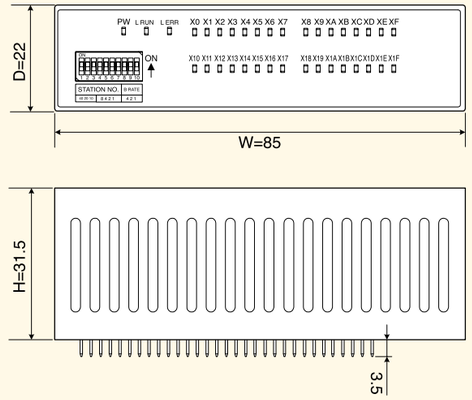
■External Dimensions

AJ65MBTL1N-16DT, AJ65MBTL1N-16D, AJ65MBTL1N-16T



53 (W) x 31.5 (H) x 22 (D) (Unit: mm)

AJ65MBTL1N-32D, AJ65MBTL1N-32T



85 (W) x 31.5 (H) x 22 (D) (Unit: mm)

■Model Configuration

Model	Specifications
AJ65MBTL1N-16DT	24V DC input, plus common (sink type): 8 points; Transistor 0.1A sink output: 8 points
AJ65MBTL1N-16D	24V DC input, plus common (sink type): 16 points
AJ65MBTL1N-16T	Transistor 0.1A sink output: 16 points
AJ65MBTL1N-32D	24V DC input, plus common (sink type): 32 points
AJ65MBTL1N-32T	Transistor 0.1A sink output: 32 points

■Manual

Title	Model Code	IB/SH No.	Contact
CC-Link Embedded I/O Adapter User's Manual (CC-LINK-M-I/O-U-E)	13JR59	SH-080324E	Mitsubishi Electric Corporation

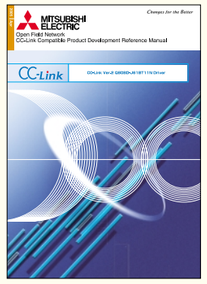
■CC-Link Embedded I/O Adapter

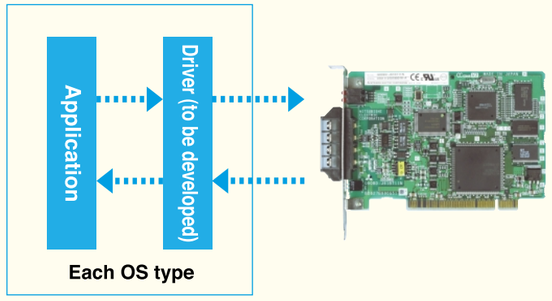
Name	Model	Packaging Unit	Contact
CC-Link Embedded I/O Adapter	AJ65MBTL1N-16DT	50 pieces/lot	Mitsubishi Electric Corporation
	AJ65MBTL1N-16D		
	AJ65MBTL1N-16T		
	AJ65MBTL1N-32D		
	AJ65MBTL1N-32T		

CC-Link Developing CC-Link Ver.2 Q80BD-J61BT11N Drivers

Purchase reference manual

Developing the Q80BD-J61BT11N Driver





The CC-Link Ver.2 Q80BD-J61BT11N Driver Reference Manual helps you develop the various types of OS compatible drivers for the PC interface board Q80BD-J61BT11N. By developing the drivers, you will be able to use PCs that run on various operating systems as master stations and local stations. The reference manual provides the hardware information (PCI configuration, 2-port, I/O port memory maps) and software information (driver initialization procedure and parameter setup procedure) required for driver development as well as sample codes and operation check methods.
This manual comes with a CD-ROM that contains sample code. Since the sample code is compiled using Visual C 6.0 on a Windows NT® 4.0 workstation and performs master station or local station operations, the code is written in C language. The sample code supports Ver.2 compatible extended cyclic transmission and transient transmission.

•Upon request, software development partners are introduced.

■Manual

CC-Link Ver.2 Q80BD-J61BT11N Driver Reference Manual

Title	Manual No.	Contact
CC-Link Ver.2 Q80BD-J61BT11N Driver Reference Manual	SH(NA)-080601ENG	Mitsubishi Electric Corporation

CC-Link CC-Link Ver.2 Compatible PC Interface Board

Q80BD-J61BT11N

1. The CC-Link Ver.2 compatible PC interface board allows you to build a PC into a CC-Link Ver.2 system.
   By mounting a CC-Link Ver.2 board onto the PC, the PC can be used as a Ver.2 compatible master station, standby master station or local station.
2. The parameters can be easily set.
   The parameters required for CC-Link system operation can be easily set using CC-Link Ver.2 Utilities.
3. The PC displays CC-Link system related test and monitor information.
   The CC-Link system test and monitor status information can be easily displayed using the PC.
4. The board is QCPU (Q mode) multi-CPU system compatible.
   Communication with each QCPU (Q mode) of a multi-CPU system is possible by utilizing the logic station number specification using CC-Link Ver.2 Utilities.

■Q80BD-J61BT11N

■Performance Specifications

Item	Specifications
Station type	Master station, standby master station or local station
No. of occupied stations (for local station)	1 to 4 stations (changed using the parameter settings of Utilities)
No. of mountable boards	Maximum of 4
Mounting slot	PC, PCI bus slot
PCI bus performance	32-bit bus, basic clock: 33MHz, 5V DC ± 5%, PCI Standard Rev.2.2
Occupied slots	1 slot
5V DC internal current consumption	0.56A
Weight	0.11kg
Included software	Windows®NT4.0/Windows®2000/XP software package (1 CD-ROM)

NEW Products that do not include the Windows®NT4.0/Windows®2000/XP software package (CD-ROM) are also available. For details, please consult your dealer network.

CC-Link/LT Developing the Master Stations

Purchase reference manual | Purchase dedicated LSI | Purchase recommended Parts | Conformance test

Dedicated Communication LSI CLC13

The master station is comprised of a master station communication LSI (CLC13) and peripheral communication circuitry. A “General Block Diagram” of the master station is shown below.

1. CC-Link/LT Communication Interface

[1] Master Station Function

The CC-Link/LT communication interface has a CC-Link/LT master station function, enabling data linkage with CC-Link/LT remote stations.

[2] Monitor Function

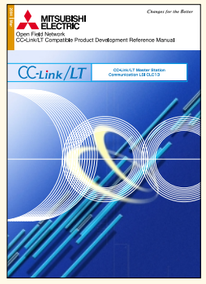
The monitor function allows you to monitor CC-Link/LT transmission frames (master station send frames and remote station transmission frames). (The function lets you monitor transmission frame remote I/O data and remote station status information.)

2. Microcomputer Interface

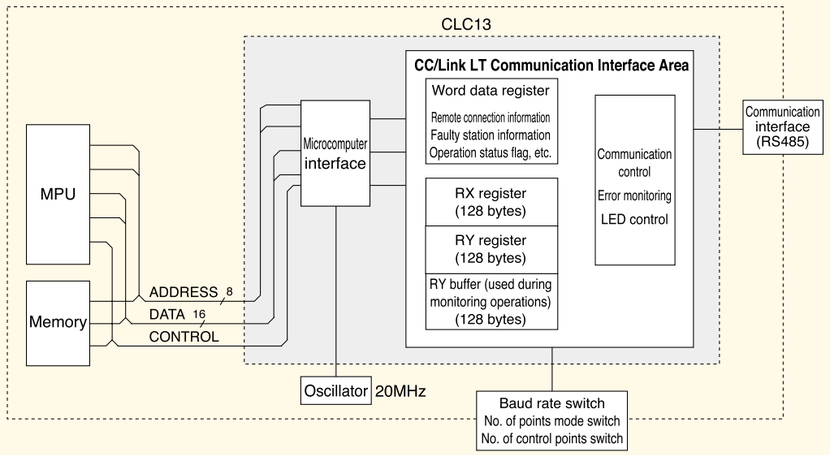
The CC-Link/LT communication interface includes an interface that enables general-purpose microcomputer connection, allowing you to read and write remote I/O and other data using a general-purpose microcomputer. (The communication LSI can be accessed as regular memory from the general-purpose microcomputer.)

•Lead-free/RoHS directive compliant

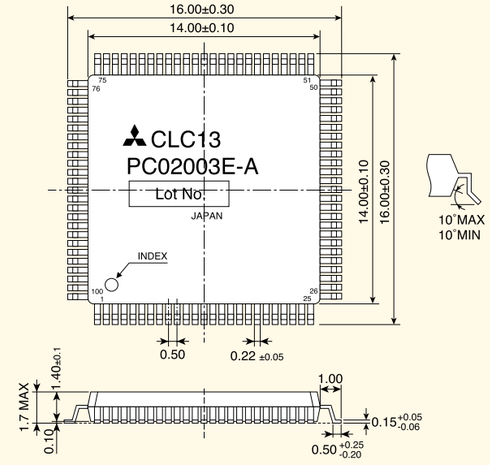
■CLC13



■General Block Diagram (CLC13)



■External Dimensions



Unit : mm

■Manual

Title	Manual No.	Contact
CC-Link/LT Master Station Communication LSI CLC13 Reference Manual	SH(NA)-080566ENG	Mitsubishi Electric Corporation

*Provides circuit examples, CLC13 electrical specifications and pin assignments.

■Dedicated Communication LSI (CLC13)

Name	Model	Packaging Unit	Contact
CLC13 (PC02003E-A)	CL2GA13-60	60 pieces	Mitsubishi Electric Corporation

*Package: 100 pins, QFP size: 12 x 12mm, Pin spacing: 0.5mm

CC-Link/LT Remote Device Stations

Purchase reference manual | Purchase dedicated LSI | Purchase recommended Parts | Conformance test

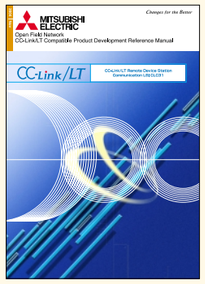
Dedicated Communication LSI CLC31

The remote device station is comprised of a remote device station communication LSI (CLC31) and peripheral communication circuitry. A “General Block Diagram” of the remote device station is shown below.

1. CLC31 is mounted on the same board with the MPU and memory device, and is controlled by user-developed software.
2. CLC31 has the CC-Link/LT protocol built-in, allowing developers to develop software without concern about the communication protocol.
3. The data amount of 4 words can be handled with a single chip. (One word is allocated for each station, and up to 4 stations can be occupied.) By setting the number of occupied stations, the developer can specify the optimum data amount for the device to be developed. This enables reduction of the number of occupied stations of the device.
4. CLC31 has a built-in function that secures 1-word (16-bit) data communication (i.e., prevents data separation). For this reason, a remote device station connected to the network must be operated in 16-bit mode.

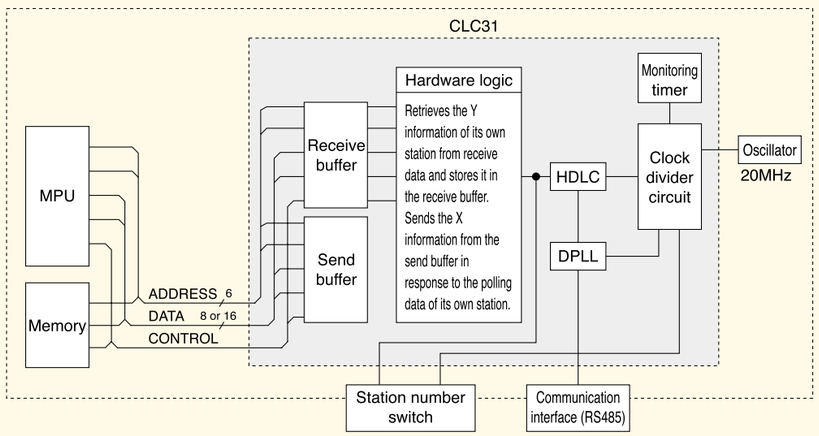
•Lead-free/RoHS directive compliant

■CLC31



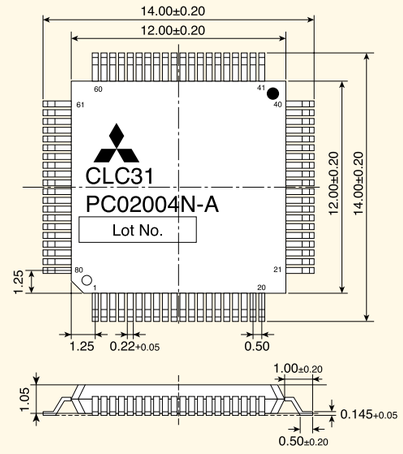
*The location of the dot may differ from the actual product.

■General Block Diagram (CLC31)

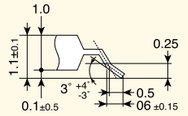


■External Dimensions (CLC31)

*The dot is impressed on the package as a lead-free/RoHS directive compliant identification mark.
*The location of the dot may differ from the actual product.



Detailed view of terminal tip shape



Unit: mm

■Manual

Title	Manual No.	Contact
CC-Link/LT Remote Device Station Communication LSI CLC31 Reference Manual	SH(NA)-080568ENG	Mitsubishi Electric Corporation

*Provides circuit examples, CLC31 electrical specifications, pin assignments, etc.

■Dedicated Communication LSI (CLC31)

Name	Model	Packaging Unit	Contact
CLC31 (PC02004N-A)	CL2GA31-60	60 pieces	Mitsubishi Electric Corporation

CC-Link/LT Remote I/O Stations

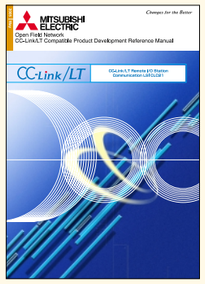
Purchase reference manual | Purchase dedicated LSI | Purchase recommended Parts | Conformance test

Dedicated Communication LSI CLC21

The remote I/O station is comprised of a remote I/O station communication LSI (CLC21) and peripheral communication (or interface card) circuitry. A “General Block Diagram” of the remote I/O station is shown below.
CC-Link/LT protocol is fully realized with CLC21, allowing development using hardware only. (MPU, software and other devices are not required.)

•Lead-free/RoHS directive compliant

■CLC21



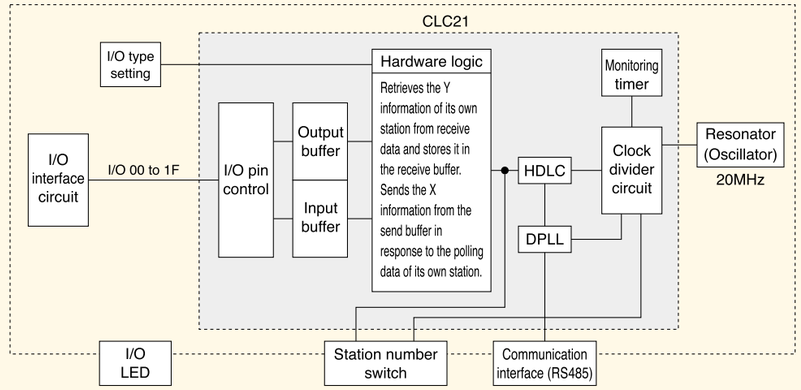
*The location of the dot may differ from the actual product.

■No. of CLC21 I/O Points

The number of I/O points can be selected from the following combinations.

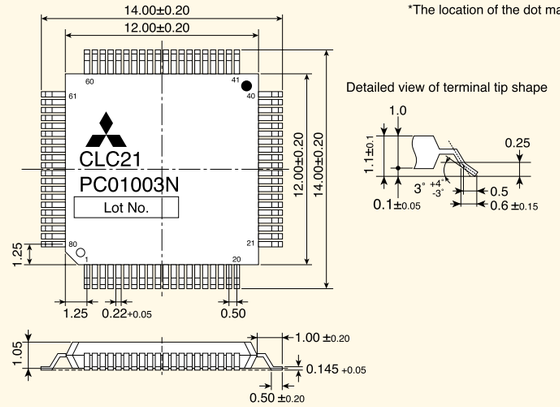
	I/O Type		Remarks
	Remote Input	Remote Output	
(1)	1 point	–	Any setting other than the 20 types is not possible.
(2)	–	1 point	
(3)	2 point	–	
(4)	1 point	1 point	
(5)	–	2 point	
(6)	4 point	–	
(7)	2 point	2 point	
(8)	–	4 point	
(9)	8 point	–	
(10)	4 point	4 point	
(11)	–	8 point	
(12)	12 point	–	
(13)	8 point	4 point	
(14)	4 point	8 point	
(15)	–	12 point	
(16)	16 point	–	
(17)	12 point	4 point	
(18)	8 point	8 point	
(19)	4 point	12 point	
(20)	–	16 point	

■General Block Diagram


CLC21
I/O type setting
I/O interface circuit
I/O 00 to 1F
I/O pin control
Output buffer
Input buffer
Hardware logic
Retrieves the Y information of its own station from receive data and stores it in the receive buffer. Sends the X information from the send buffer in response to the polling data of its own station.
Monitoring timer
HDLC
DPLL
Clock divider circuit
Resonator (Oscillator)
20MHz
I/O LED
Station number switch
Communication interface (RS485)

■External Dimensions

*The dot is impressed on the package as a lead-free/RoHS directive compliant identification mark.
*The location of the dot may differ from the actual product.



Unit: mm

■Manual

Title	Manual No.	Contact
CC-Link/LT Remote I/O Station Communication LSI CLC21 Reference Manual	SH(NA)-080567ENG	Mitsubishi Electric Corporation

*Provides circuit examples, CLC21 electrical specifications, pin assignments, etc.

■Dedicated Communication LSI (CLC21)

Name	Model	Packaging Unit	Contact
CLC21 (PC01003N)	CL2GA21-60	60 pieces	Mitsubishi Electric Corporation
	CL2GA21-300	300 pieces	

CC-Link CC-Link/LT Specified Parts

CC-Link

■CC-Link Partner Association Specified Parts

To develop CC-Link products, use of specified parts defined by the CC-Link Partner Association is required.

Item	Model	Manufacturer
Filter	ZCYS51R5-M3PAT-01	TDK Corporation
RS485 transceiver	SN75ALS181NS	Texas Instruments, Ltd.
Zener diode	RD6.2Z-T2B-A	NEC Corporation
	HZU6.2ZTRF-E	Renesas Technology Corporation
Photocoupler	HCPL-7720-500E*	Avago Technologies, Ltd.
	HCPL-0720-500E*	
Photocoupler	HCPL-2611-500E*	Avago Technologies, Ltd.
	HCPL-M611-500E*	

*Specify Option 060 when V_{IORM} = 630V_{PEAK} electrical isolation is required.
Note: For the model information of CC-Link Partner Association specified parts, contact the CC-Link Partner Association.

■Mitsubishi Electric Corporation Specified Parts

The following shows the specified parts to be used when developing a product based on a development method provided by our company.

Item	Model	Manufacturer
MPU	SH3 (SH7708R)*1	Renesas Technology Corporation
Device kit	Q6KT-NPC2OG51*1 (Flash ROM x 1, CLPD x 2) x 40	Mitsubishi Electric Corporation
Crystal oscillator	DSO751SB 80MHz	Daishinku Corporation
	KC7050B series (FXO-37FA) 80MHz	KYOCERA KINSEKI Corporation

*1: Used with object based development only.

■Specified Part and Development Method Combinations

Item	Model	Built-In Interface Board (Q50BD-CCV2) Based Development	Object Based Development	MFP2N, MFP2AN, Based Development	MFP3N Based Development	Embedded I/O Adapter (AJ65MBTL1N-***) Based Development
Filter	ZCYS51R5-M3PAT-01	○	○	○	○	—
RS485 transceiver	SN75ALS181NS	○	○	○	○	—
Zener diode	RD6.2Z-T2B-A	○	○	○	○	—
	HZU6.2ZTRF-E					
Photocoupler	HCPL-7720-500E	○	○	△	△	
	HCPL-0720-500E					
Photocoupler	HCPL-2611-500E	○	○	△	△	
	HCPL-M611-500E					
MPU*	SH3 (SH7708R)	—	○	—	—	—
Device kit*	Q6KT-NPC2OG51	—	○	—	—	—
Crystal oscillator*	DSO751SB 80MHz	—	○	○	—	—
	KC7050B series (FXO-37FA) 80MHz	—	○	—	○	—

○: Required △: Optional —: Already provided in product or not required
*Although this part is not a specified part of the CC-Link Partner Association, the part should be treated as a specified part when utilizing Mitsubishi Electric development methods.

CC-Link/LT

The following are recommended parts to be used in the communication interface circuit.
Use of the parts indicated below or parts of equivalent or better performance is required.

■Recommended Parts

Item	Model	Manufacturer
Filter	CM04RC04T	Taiyo Yuden Co., Ltd.
RS485 transceiver	MAX1487CSA	Maxim Integrated Products, Inc.
Crystal oscillator	DSO751SB 20MHz	Daishinku Corporation
Zener diode	HZU6.2ZTRF-E	Renesas Technology Corporation

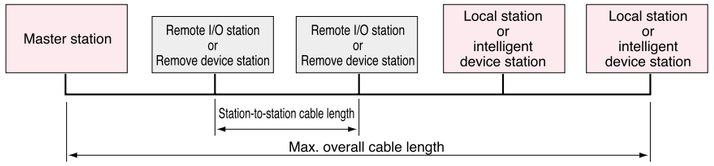
Note: For details, please contact the CC-Link Partner Association.

■Connector (Circuit Board Side)

Item	Model	Manufacturer
Right angle	38204-52S3-MOM SC	Sumitomo 3M Ltd.
Straight angle	38204-62S3-MOM SC	

CC-Link / CC-Link/LT Technical Information

CC-Link (Ver.1.10) specifications CC-Link

	Item	Specifications
Control specification	Maximum number of link points	Remote I/O (RX,RY) : 2048 points each Remote register (RWw) : 256 words Remote register (RWr) : 256 words
	Number of links per station	Remote I/O (RX,RY) : 32 points each Remote register (RWw) : 4 words Remote register (RWr) : 4 words
Communication specification	Transmission speed	10M/5M/2.5M/625k/156kbps
	Transmission method	Broadcast polling method
	Synchronous method	Frame synchronous method
	Encoding method	NRZI method
	Transmission path	Bus type (conforming to EIA RS485)
	Transmission format	conforming to HDLC
	Error control system	CRC ($X^{16} + X^{12} + X^5$ x 1)
	Number of connected modules	64 modules. However, the following conditions must be satisfied. (1 x a) + (2 x b) + (3 x c) + (4 x d) =<64 a: Number of modules occupying 1 station, b: Number of modules occupying 2 stations, c: Number of modules occupying 3 stations, d: Number of modules occupying 4 stations (16 x A) + (54 x B) + (88 x C) =< 2304 A: Number of remote I/O stations ····· Max. 64 modules B: Number of remote device stations ····· Max. 42 modules C: Local station, standby master station, intelligent device station ····· Max. 26 modules
	Remote station No.	1 to 64
	Maximum total cable length and cable length between stations	 CC-Link Ver.1.10 compatible cable (110Ω terminator used)

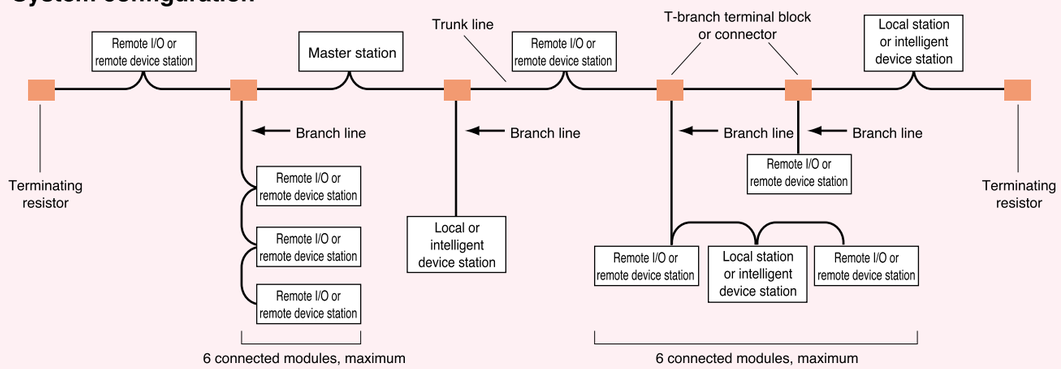
Transmission speed	Station-to-station cable length	Max. overall cable length
156kbps	20cm or more	1200m
625kbps		900m
2.5Mbps		400m
5Mbps		160m
10Mbps		100m

When Ver1.10 and Ver1.00 products are mixed, the max. overall cable length and the station-to-station cable length conform to the Ver1.00 specifications.

	Connection cable	Dedicated cable compatible with CC-Link Version 1.10 • Use the dedicated cable certified by CC-Link Partnership Association. • Please note that operation will not be guaranteed if CC-Link certified cable is not used. • Cables from different manufacturers can be used together if they support Version 1.10. • For the specifications of the CC-Link dedicated cable or the contact information on them, refer to the partner product catalogs published by CC-Link Partner Association or visit its web site at http://www.cc-link.org
Function	Auto refresh function*1 RAS functions (standby master, automatic return, slave station separation, link special relay, error detection by the register, test/monitor) *1. May not be supported depending on CPUs to be used together. *2. This function is available only for the Q Series.	Remote I/O network mode*1 Scan synchronous function Automatic CC-Link startup*2 Reserved station function Error invalid station setting function Support for duplex function*2

T-Branch Communication Specifications [Without Repeater (T-Branch) Module Use] CC-Link

System configuration

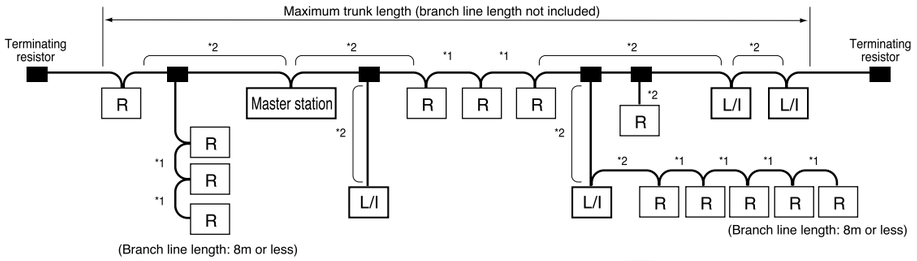


The communication specifications not listed below are in accordance with CC-Link specifications.
The following shows the communication specifications in the case of T-branch connection without use of a repeater (T-branch) module.

Item	Specifications		Remarks
Transmission speed	625kbps	156kbps	10M/5M/2.5Mbps not permitted
Maximum trunk line length	100m	500m	Cable length between terminating resistors (Branch line length not included)
Maximum branch line length	8m		Total cable length per branch
Overall branch line length	50m	200m	Total length for all branch cables
Maximum number of modules connected to a branch line	6 modules per branch		Total number of connected modules: In accordance with CC-Link specifications
Cable	• CC-Link dedicated cable		• Do not use a CC-Link dedicated high-performance cable (such as FANC-SBH). • Do not use cables of different manufacturers together when the network uses T-branch configurations without repeaters.
T-branch terminal block or connector	• Terminal block: Commercial terminal block • Connector: FA sensor connector NECA4202 (IEC947-5-2) equivalent (recommended) (NECA: Nippon Electric Control Equipment Industries Association)		• Route the trunk line side cables without peeling off the sheath, to the extent possible.
Maximum trunk line length, T-branch interval and cable length between stations	CC-Link Dedicated Cable (With 110Ω terminating resistance)		

Transmission speed	Maximum Trunk Length	T-Branch Interval	Cable Length Between Remote I/O Stations or Remote Device Stations*1	Cable Length Between Master Local Station or Intelligent Device Station and Previous or Next Station*2
625kbps	100m	No restriction	30cm or more	1m or more (A), 2m or more (B)
156kbps	500m			

(A) : 1m or more: With a system configuration comprised of remote I/O and remote device stations only.
(B) : 2m or more: With a system configuration that contains local stations and intelligent device stations.



CC-Link / CC-Link/LT Technical Information

Differences between CC-Link Ver.2 and Ver.1 CC-Link

With Ver.2, the cyclic data size can be increased through extended cyclic setting.

CC-Link Ver.1 specification

Item		Specifications		
Maximum number of link points		Remote I/O (RX, RY): 2048 points each	Remote register (RWw): 256 words	Remote register (RWr): 256 words
Number of link points per station		Remote I/O (RX, RY): 32 points each	Remote register (RWw): 4 words each	Remote register (RWr): 4 words each
Number of linked points for each occupied station number	1 station occupied	Remote I/O (RX, RY): 32 points each	Remote register (RWw): 4 words each	Remote register (RWr): 4 words each
	2 station occupied	Remote I/O (RX, RY): 64 points each	Remote register (RWw): 8 words each	Remote register (RWr): 8 words each
	3 station occupied	Remote I/O (RX, RY): 96 points each	Remote register (RWw): 12 words each	Remote register (RWr): 12 words each
	4 station occupied	Remote I/O (RX, RY): 128 points each	Remote register (RWw): 16 words each	Remote register (RWr): 16 words each
Number of connected modules		1. Total number of stations (1 x a) + (2 x b) + (3 x c) + (4 x d) =< 64 a: Number of modules 1 occupied station, b: Number of modules 2 occupied stations, c: Number of modules 3 occupied stations, d: Number of modules 4 occupied stations 2. Number of connected units (16 x a) + (54 x b) + (88 x c) =< 2304 A: Number of remote I/O station ····· Max. 64 modules B: Number of remote device station ····· Max. 42 modules C: Local stations, stand by master stations, intelligent device stations····· Max. 26 modules		

CC-Link Ver.2 specification

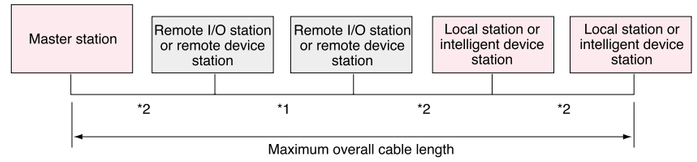
Item			Specifications			
Maximum number of link points			Remote I/O (RX, RY): 8192 points each, Remote register (RWw): 2048 words, Remote register (RWr): 2048 words			
Expanded cycle setting			Single	Double	Quadruple	Octuple
Number of link points per station		Remote I/O (RX, RY)	32 points each	32 points each	64 points each	128 points each
		Remote register (RWw)	4 words	8 words	16 words	32 words
		Remote register (RWr)	4 words	8 words	16 words	32 words
Number of Linked points for each occupied station number	1 station occupied	Remote I/O (RX, RY)	32 points each	32 points each	64 points each	128 points each
		Remote register (RWw)	4 words	8 words	16 words	32 words
		Remote register (RWr)	4 words	8 words	16 words	32 words
	2 station occupied	Remote I/O (RX, RY)	64 points each	96 points each	192 points each	384 points each
		Remote register (RWw)	8 words	16 words	32 words	64 words
		Remote register (RWr)	8 words	16 words	32 words	64 words
	3 station occupied	Remote I/O (RX, RY)	96 points each	160 points each	320 points each	640 points each
		Remote register (RWw)	12 words	24 words	48 words	96 words
		Remote register (RWr)	12 words	24 words	48 words	96 words
	4 station occupied	Remote I/O (RX, RY)	128 points each	224 points each	448 points each	896 points each
		Remote register (RWw)	16 words	32 words	64 words	128 words
		Remote register (RWr)	16 words	32 words	64 words	128 words
Number of connected modules			1. Total number of stations (a + a2 + a4 + a8) + (b + b2 + b4 + b8) x 2 + (c + c2 + c4 + c8) x 3 + (d + d2 + d4 + d8) x 4 =<64 2. Number of input/output points of all remote stations (a x 32 + a2 x 32 + a4 x 64 + a8 x 128) + (b x 64 + b2 x 96 + b4 x 192 + b8 x 384) + (c x 96 + c2 x 160 + c4 x 320 + c8 x 640) + (d x 128 + d2 x 224 + d4 x 448 + d8 x 896) =<8192 3. Number of all remote register words (a x 4 + a2 x 8 + a4 x 16 + a8 x 32) + (b x 8 + b2 x 16 + b4 x 32 + b8 x 64) + (c x 12 + c2 x 24 + c4 x 48 + c8 x 96) + (d x 16 + d2 x 32 + d4 x 64 + d8 x 128) =<2048 a: Number of modules of 1x setting of 1 occupied station a2: Number of modules of 2x setting of 1 occupied station a4: Number of modules of 4x setting of 1 occupied station a8: Number of modules of 8x setting of 1 occupied station b: Number of modules of 1x setting of 2 occupied station b2: Number of modules of 2x setting of 2 occupied station b4: Number of modules of 4x setting of 2 occupied station b8: Number of modules of 8x setting of 2 occupied station c: Number of modules of 1x setting of 3 occupied station c2: Number of modules of 2x setting of 3 occupied station c4: Number of modules of 4x setting of 3 occupied station c8: Number of modules of 8x setting of 3 occupied station d: Number of modules of 1x setting of 4 occupied station d2: Number of modules of 2x setting of 4 occupied station d4: Number of modules of 4x setting of 4 occupied station d8: Number of modules of 8x setting of 4 occupied station 4. Number of connected modules 16 x A+54 x B+88 x C =< 2304 A: Number of modules of remote I/O stations B: Number of remote device stations C: Local stations, stand by master stations, intelligent device stations			

* "2." and "3." are Ver.2 mode only; calculation is necessary.
* There is no change in the cable and wiring specification for CC-Link Ver.2. Use Ver.1 cable for the connection of Ver.2 devices.

CC-Link specifications CC-Link

■The CC-Link Ver.1.10 and Ver.1.00 specifications differ in the following two items:
- Maximum overall cable length and cable length between stations
- Cable

CC-Link Ver.1.00 Specifications (Differences from Ver.1.10)

Item	Specifications
Maximum overall cable length and cable length between stations	 *1. Cable length between remote I/O stations or remote device stations *2. Cable length between master local station or intelligent device station and previous or next station CC-Link Dedicated Cable (with 110Ω terminating resistance)
Cable	CC-Link dedicated cable or CC-Link dedicated high-performance cable • Dedicated cables and dedicated high-performance cables cannot be used together. • Cables of different manufacturers cannot be used together.

Transmission speed	Cable Length Between Stations *1	Cable Length Between Stations *2	Maximum Overall Cable Length
156kbps	30cm or more	1m or more(A), 2m or more(B)	1200m
625kbps			600m
2.5Mbps			200m
5Mbps	30cm to 59cm		110m
	60cm or more		150m
10Mbps	30cm to 59cm		50m
	60cm to 99cm		80m
	1m or more		100m

(A) : 1m or more: With a system configuration comprised of remote I/O and remote device stations only.
(B) : 2m or more: With a system configuration that contains local stations and intelligent device stations.

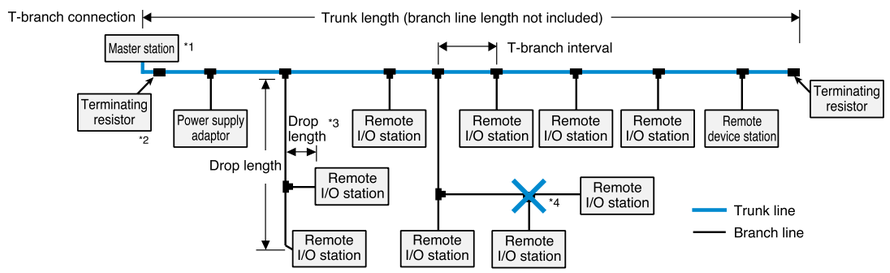
The above maximum overall cable length applies when the cable length between remote I/O stations or remote device stations is within the indicated range at one or more locations.

CC-Link/LT specifications CC-Link/LT

Item			4-point mode	8-point mode	16-point mode
Control specifications	Maximum number of link points Points within parentheses assume that I/O are used		256 points (512 points)	512 points (1024 points)	1024 points (2048 points)
	Number of link points per station Points within parentheses assume that I/O are used		4 points (8 points)	8 points (16 points)	16 points (32 points)
	Link scan time (ms)	When 32 stations are connected	Number of points	128 points	256 points	512 points
			2.5 Mbps	0.7	0.8	1.0
			625 kbps	2.2	2.7	3.8
			156 kbps	8.0	10.0	14.1
		When 64 stations are connected	Number of points	256 points	512 points	1024 points
			2.5 Mbps	1.2	1.5	2.0
			625 kbps	4.3	5.4	7.4
			156kbps	15.6	20.0	27.8
Communication specification	Transmission speed		2.5M/625k/156kbps		
	Protocol		BITR (Broadcast polling+Interval Timed Response)		
	Network topology		T-branch		
	Error control method		CRC		
	Number of connected units		64		
	Remote station numbers		1 to 64		
	Maximum number of modules connected in 1 drop line		8		
	Distance between stations		No restriction		
	T-branch interval		No restriction		
	Master station connection position		Connected to the end of the main line		
	RAS functions		Network diagnostics, internal loopback diagnostics, slave station separation, automatic return to system		
	Connection cable		Dedicated flat cable(0.75mm2 x 4), VCTF cable, Movable cable		

CC-Link / CC-Link/LT Technical Information

CC-Link/LT network wiring specifications CC-Link/LT



Item	Specifications			Remarks
Transmission speed	2.5Mbps	625 kbps	156kbps	–
Distance between stations	No restriction			–
Maximum number of modules connected in 1 drop line	8 units			–
Maximum trunk length	35m	100 m	500m	Cable length between terminating resistors (Branch line length not included)
T-branch interval	No restriction			–
Maximum drop length	4m	16 m	60m	Cable length per branch
Cumulative drop line length	15m	50 m	200m	Sum of all branch lines

*1 Always install the master module at one end of the trunk line.
*2 Install the terminating resistor near the master module (within 20 cm).
*3 The length branched from the drop line is also included in the maximum drop length and cumulative drop line length.
*4 Cables cannot be connected between drop lines.

Precautions when mixed cables are used

1. *Different types of cables cannot be used together in the trunk line.*
2. *Different types of cables cannot be used together in the same drop line.*
   * When the module with cable (e.g. CL1Y2-T1D2S) is used, it can be connected to a different type of cable by making sure the dedicated cables in within 20 cm.
3. *Dedicated flat cables, VCTF cables and flexible cables can be used together in drop lines.*
   * The wiring specifications do not change depending on the used cables and mixed use of cables.

CC-Link - Open and Global ! CLPA is supporting the spread of CC-Link.

Exhibiting in trade shows, conducting conformance tests, sending out the latest information... Through these and other popularization activities, CLPA is extending the possibilities of CC-Link.

The Japan-original open field network, CC-Link. CLPA (CC-Link Partner Association), in which Mitsubishi Electric also participates, was established with a view to spreading CC-Link to the world. Through vigorous activities such as planning and running trade shows and seminars, conducting conformance tests, and providing information by catalogs, pamphlets, and the Internet, the number of CLPA partner manufacturers and CC-Link compatible products is increasing steadily, and the CLPA is becoming a driving force for the globalization of CC-Link.

Conformance tests support the rapid increase of compatible products.

CC-Link Partner Association

This web site provides the latest CC-Link information.

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URL: http://www.cc-link.org E-mail: cc-link@post0.mind.ne.jp

CC-Link - Open and Global! CC-Link is accelerating toward a global network.

CLPA has established CLPA offices all over the world in order to spread CC-Link to Japanese and other global manufacturers. Through positive activities such as exhibiting in trade shows in the major cities and setting up conformance test organizations, CLPA sends out information designed to expand the potential of CC-Link and increasing the number of CLPA partners.

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E-mail:cclink@asia.meap.com

CC-Link / CC-Link/LT Related Product List

■Manual

Development Application		Title	Manual No.
CC-Link	Master station, local station, intelligent device station	CC-Link Ver.2 Built-In Interface Board Reference Manual	SH(NA)-080324ENG
		CC-Link Ver.2 Compatible Product Development Tool with Object Software Reference Manual	SH(NA)-080552ENG
	Remote device station	CC-Link Remote Device Station Communication LSI MFP3N Reference Manual	SH(NA)-080624ENG
	Remote I/O station	CC-Link Remote I/O Station Communication LSI MFP2N Reference Manual	SH(NA)-080622ENG
		CC-Link Remote I/O Station Communication LSI MFP2AN Reference Manual	SH(NA)-080623ENG
		CC-Link Embedded I/O Adapter User's Manual (CC-LINK-M-I/O-U-E)	SH(NA)-080324E
	CC-Link Ver.2 Q80BD-J61BT11N OS drivers	CC-Link Ver.2 Q80BD-J61BT11N Driver Reference Manual	SH(NA)-080601ENG
CC-Link/LT	Master station	CC-Link/LT Master Station Communication LSI CLC13 Reference Manual	SH(NA)-080566ENG
	Remote device station	CC-Link/LT Remote Device Station Communication LSI CLC31 Reference Manual	SH(NA)-080568ENG
	Remote I/O station	CC-Link/LT Remote I/O Station Communication LSI CLC21 Reference Manual	SH(NA)-080567ENG

■Products

Development Application		Name	Model (for Ordering)	Packaging Unit
CC-Link	Master station, local station, intelligent device station	CC-Link Ver.2 Built-In Interface Board	Q50BD-CCV2	1 board
		Dedicated Communication LSI MFP1N (PC96002M-C)	A6GA-CCMFP1NN60F	60 pieces
			A6GA-CCMFP1NN300F	300 pieces
		Device Kit (Flash ROM X 1, CPLD X 2)	Q6KT-NPC2OG51	40 sets
		CC-Link Ver. 2 Compatible PC Interface Board	Q80BD-J61BT11N	1 board
	Remote device station	Dedicated Communication LSI MFP3N (PC03003N)	A6GA-CCMFP3NN60F	60 pieces
			A6GA-CCMFP3NN300F	300 pieces
	Remote I/O station	Dedicated Communication LSI MFP2N (PC03002N)	A6GA-CCMFP2NN60F	60 pieces
			A6GA-CCMFP2NN300F	300 pieces
		Dedicated Communication LSI MFP2AN (PC97007N)	A6GA-CCMFP2ANN60F	60 pieces
			A6GA-CCMFP2ANN300F	300 pieces
		CC-Link Built-In Module I/O	AJ65MBTL1N-16DT	50 pieces/lot
			AJ65MBTL1N-16D	
			AJ65MBTL1N-16T	
			AJ65MBTL1N-32D	
			AJ65MBTL1N-32T	
CC-Link/LT	Master station	Dedicated Communication LSI CLC13 (PC02003E-A)	CL2GA13-60	60 pieces
	Remote device station	Dedicated Communication LSI CLC31 (PC02004N-A)	CL2GA31-60	60 pieces
	Remote I/O station	Dedicated Communication LSI CLC21 (PC01003N)	CL2GA21-60	60 pieces
			CL2GA21-300	300 pieces

CC-Link / CC-Link/LT Warranty on CC-Link and CC-Link/LT Dedicated LSI (Hereafter Referred to as Dedicated LSI)

Please confirm the following product warranty details before using the dedicated LSI.

Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure ") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be replaced at no cost via the sales representative or Mitsubishi Service Company.

■Gratis Warranty Term

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place.
Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months.

■Gratis Warranty Range

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.

(2) Even within the gratis warranty term, the cost of replacement shall be charged for the following cases.

1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
2. Failure caused by unapproved modifications, etc., to the product by the user.
3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
4. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
5. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
6. Any other failure found not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

After discontinuation of production

(1) Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.

(2) Product supply (including spare parts) is not available after production is discontinued.

After-sales service

(1) When it is necessary to diagnose a failure, Mitsubishi will diagnose only the dedicated LSI. Please bring in the dedicated LSI that has been removed by the customer from the product where it had been incorporated. Mitsubishi will not provide on-site services.

(2) Outside of Japan, product replacements shall be accepted by Mitsubishi's local overseas FA Center. Note that the product replacement conditions at each FA Center may differ.

Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation of damages caused by any cause found not to be the responsibility of Mitsubishi, loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products, special damages and secondary damages whether foreseeable or not , compensation for accidents, and compensation for damages to products other than Mitsubishi products, replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

Product application

(1) In using the Mitsubishi dedicated LSI, the usage conditions shall be that the application will not lead to a major accident even if any problem or fault should occur in the device that incorporates the dedicated LSI, and that backup and fail-safe functions are systematically provided outside of the device for any problem or fault.

(2) The Mitsubishi dedicated LSI has been designed and manufactured for applications in general industries, etc. Thus, applications in which the public could be affected such as in nuclear power plants and other power plants operated by respective power companies, and applications in which a special quality assurance system is required, such as for Railway companies or Public service purposes shall be excluded from the dedicated LSI applications.
In addition, applications in which human life or property that could be greatly affected, such as in aircraft, medical applications, incineration and fuel devices, manned transportation, equipment for recreation and amusement, and safety devices, shall also be excluded from the dedicated LSI range of applications.
However, in certain cases, some applications may be possible, providing the user consults their local Mitsubishi representative outlining the special requirements of the project, and providing that all parties concerned agree to the special circumstances, solely at the users discretion.

Open Field Network
CC-Link, CC-Link/LT Compatible Product Development Guidebook

Country/Region	Sales office	Tel/Fax
U.S.A	Mitsubishi Electric Automation, Inc. 500 Corporate Woods Parkway, Vernon Hills, IL 60061, USA	Tel : +1-847-478-2100 Fax : +1-847-478-0327
Brazil	MELCO-TEC Representacao Comercial e Assessoria Tecnica Ltda. Rua Correia Dias, 184, Edificio Paraiso Trade Center-8 ander Paraiso, Sao Paulo, SP Brasil CEP:04104-000	Tel : +55-11-5908-8331 Fax : +55-11-5574-5296
Germany	Mitsubishi Electric Europe B.V. German Branch Gothaer Strasse 8, D-40880 Ratingen, Germany	Tel : +49-2102-486-0 Fax : +49-2102-486-7170
U.K	Mitsubishi Electric Europe B.V. UK Branch Travellers Lane, Hatfield, Hertfordshire., AL10 8XB,U.K.	Tel : +44-1707-276100 Fax : +44-1707-278695
Italy	Mitsubishi Electric Europe B.V. Italian Branch Gothaer Strasse 8, D-40880 Ratingen, Germany	Tel : +49-2102-486-0 Fax : +49-2102-486-7170
Spain	Mitsubishi Electric Europe B.V. Spanish Branch Carretera de Rubi 76-80, E-08190 Sant Cugat del Valles (Barcelona), Spain	Tel : +34-93-565-3131 Fax : +34-93-589-2948
France	Mitsubishi Electric Europe B.V. French Branch 25, Boulevard des Bouvets, F-92741 Nanterre Cedex, France	Tel : +33-1-55685568 Fax : +33-1-55685685
South Africa	Circuit Breaker Industries LTD. Private Bag 2016, ZA-1600 Isando, South Africa	Tel : +27-11-928-2000 Fax : +27-11-392-2354
Hong Kong	Mitsubishi Electric Automation (Hong Kong) Ltd. 10th Floor, Manulife Tower, 169 Electric Road, North Point, HongKong	Tel : +852-2887-8870 Fax : +852-2887-7984
China	Mitsubishi Electric Automation (Shanghai) Ltd. 4/F Zhi Fu Plazz, No.80 Xin Chang Road, Shanghai, China	Tel : +86-21-6121-2460 Fax : +86-21-6121-2424
	Mitsubishi Electric Automation (Shanghai) Ltd. Beijing Office Unit 917-918, 9F, Office Tower 1, Henderson Centre, 18 Jianguomennei Avenue, Dongcheng District, Beijing, China	Tel : +86-10-6518-8830 Fax : +86-10-6518-8030
	Mitsubishi Electric Automation (Shanghai) Ltd. Tianjin Office B-2-801-802, Youyi Building, 50 Youyi Road, Hexi District, Tianjin, China	Tel : +86-22-2813-1015 Fax : +86-22-2813-1017
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Korea	Mitsubishi Electric Automation Korea Co., Ltd. 1480-6, Gayang-dong, Gangseo-ku Seoul 157-200, Korea	Tel : +82-2-3660-9552 Fax : +82-2-3664-8372
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